

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

TREE/SHRUB ESTABLISHMENT

(Ac.)

CODE 612



Longleaf pine seedling (Photo © Longleaf Alliance)

**DEFINITION**

Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration.

**PURPOSE**

Establish woody plants for:

- forest products such as timber, pulpwood, and energy biomass;
- long-term erosion control and improvement of water quality;
- treating waste;
- storing carbon in biomass;
- energy conservation;
- wildlife habitat;
- improving or restoring natural diversity; and
- enhancing aesthetics.

**CONDITIONS WHERE PRACTICE APPLIES**

Tree/shrub establishment can be applied on any appropriately prepared site where woody plants can be grown.

Utilize other practice standards for specialized tree/shrub establishment situations, e.g., Florida NRCS Conservation Practice Standards Riparian Forest Buffer, Code 391; Alley Cropping, Code 311; Windbreak/Shelterbelt Establishment, Code 380; Critical Area Planting, Code 342; and Hedgerow Planting, Code 422.

**CRITERIA**

**General Criteria Applicable to All Purposes**

Select a species composition that is adapted to site conditions and suitable for the planned purpose(s). Do not use species considered locally invasive or noxious [see Florida NRCS FOTG Sect. I (f) (4)].

Make sure planting or seeding rates are adequate to accomplish the planned purpose for the site. Use only viable, high-quality, and adapted planting stock or seed. Commercially produced seed needs to have greater than 85% germination and a minimum of 95% purity. When using natural regeneration to establish a stand, be sure that adequate seed sources or advanced reproduction is present. Species, age, and diameter determine the acceptability and timing of coppice regeneration. See Florida NRCS Tree/Shrub Establishment Guidance for more information.

Ensure that the plant materials have an acceptable survival rate by proper care in handling and planting of seed, cuttings, or seedlings and selecting an appropriate

planting date. Site and soil conditions determine the correct planting technique and timing. Select plant spacing to accommodate normal growth rate and proper plant form. See Florida NRCS Tree/Shrub Establishment Guidance for more information.

A precondition for tree/shrub establishment is appropriately prepared sites. For both natural regeneration and direct seeding, at least 50% mineral soil needs to be exposed immediately prior to seeding. Use raised plant beds only when bedding is essential for tree or shrub survival and bedding will not change the natural hydrology of the site or cause erosion problems. Follow topographic contours when planting on slopes where erosion hazards exist. Refer to Florida NRCS Conservation Practice Standard Tree/Shrub Site Preparation, Code 490, and Florida NRCS Tree and Shrub Guidance for more information.

Protect the planting from plant and animal pests and fire. Livestock need to be excluded from a stand until the terminal growing point (i.e., meristem) is above the browse line. It may be necessary to exclude browsing wildlife by installation of electric fence, where practical (see Florida NRCS Conservation Practice Standard Use Exclusion, Code 472, for more information).

If pesticides are used, refer to Florida NRCS Conservation Practice Standard Pest Management, Code 595, as appropriate. Evaluate each site to determine if mulching, supplemental water, or other cultural treatments (e.g., tree protection devices, shade cards, brush mats) are needed to assure adequate survival and growth.

Comply with Florida Division of Forestry BMPs as described in the Florida Division of Forestry's *Silviculture Best Management Practices* ([http://www.fl-dof.com/forest\\_management/bmp/](http://www.fl-dof.com/forest_management/bmp/)). If there is a difference between the FL NRCS practice standards and the FL Division of Forestry BMPs, NRCS standards have preference.

Impact to cultural resources, wetlands, and Federal and State protected species need to be avoided or minimized to the extent practical during planning, design, and implementation of this conservation practice in accordance with

established National and Florida NRCS policy; General Manual (GM) Title 420-Part 401, Title 450-Part 401, and Title 190-Parts 410.22 and 410.26; National Planning Procedures Handbook (NPPH) FL Supplements to Parts 600.1 and 600.6; National Cultural Resources Procedures Handbook (NCRPH); and The National Environmental Compliance Handbook (NECH).

#### **Additional Criteria for Treating Waste**

Species used to treat waste need to have fast growth characteristics, extensive root systems, high nutrient uptake capacity and tolerance of the planned effluent.

#### **Additional Criteria for Storing Carbon in Biomass**

The species and plant communities that attain biomass more quickly will sequester carbon faster. As trees and/or shrubs mature and soil organic matter increases, carbon sequestration rates increase. Thus, it is important to select plants that have higher rates of growth and potential for carbon sequestration in biomass and are adapted to the site.

In general, within a growth rate class (e.g., slow, medium, or fast) hardwoods will sequester more pounds of carbon per tree per year than conifers. Examples of hardwood trees with:

- slow growth rate - American holly (*Ilex opaca*) and flowering dogwood (*Cornus florida*);
- medium growth rate - southern magnolia (*Magnolia grandifolia*) and water oak (*Quercus laurifolia*); and
- fast growth rate - live oak (*Quercus virginiana*) and black cherry (*Prunus serotina*).

Examples of conifers with:

- slow growth rate - balsam fir (*Abies balsamea*) and European black pine (*Pinus nigra*);
- medium growth rate - Eastern red cedar (*Juniperus virginiana*) and Virginia pine (*Pinus virginiana*); and

- fast growth rate - longleaf pine (*Pinus palustris*) and baldcypress (*Taxodium distichum*).

More information on trees commonly grown in the United States and their age and growth rate dependant expected carbon sequestration rates can be found in Tables 1 and 2 of the Department of Energy, Energy Information Administration publication "Method for Calculating Sequestration by Trees in Urban and Suburban Situations (<ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/sequester.pdf>).

In addition to species selection, planting species at the appropriate stocking rate for the site is important for carbon sequestration. Overstocking can reduce sequestration potential by retarding growth rate, while understocking reduces sequestration potential due to the few number of trees per acre.

#### **Additional Criteria for Improving or Restoring Natural Diversity**

Composition of species selected for planting or those favored for natural regeneration need to be native to the site and create a successional stage or state that can progress to the potential natural plant community. The density and distribution of species need to be similar to predominant species in reference stand or appropriate technical reference. To restore diverse communities, at least four indigenous trees and four indigenous shrub species are needed.

#### **CONSIDERATIONS**

Where practical and acceptable, incorporate prescribed burning in to conservation planning for fire adapted communities. Do not conduct a prescribed burn during or immediately after periods of extended drought.

When planting on agricultural and pastureland with soil compaction or where plow- or hard-pans exist, subsoiling in combination with scalping may be essential. Scalping is necessary when sod forming grasses, weeds, or forbs compete heavily with pine seedling.

See

<http://www.longleafalliance.org/landowners/forestrestoration/siteprepc.htm> or Florida NRCS

Conservation Practice Standard Forest Preparation, Code 490, for more information.

Give priority to plant materials that have been selected and tested in tree/shrub improvement programs (e.g., NRCS Plant Materials Program or University of Florida <http://edis.ifas.ufl.edu/FR007>). All plant materials need to comply with minimum standards such as those established by the American Nursery and Landscape Association, Forest Service, or state-approved nursery.

Consider foliage color, season and color of flowering, and mature plant height when planning for landscape and beautification plantings.

Consider using species which best meet local wildlife needs. When practical, leave snags (i.e., dead standing trees) and cavity trees for wildlife.

Tree/shrub arrangement and spacing needs to allow for and anticipate the need for future access lanes for purposes of stand management.

Evaluate residual chemical carryover prior to planting and alter species selection and/or timing of planting/seeding.

When underplanting, plant trees sufficiently in advance of overstory removal to ensure full establishment.

#### **PLANS AND SPECIFICATIONS**

Specifications for applying this practice need to be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation. Minimally, plans and specifications need to include:

- A properly labeled NRCS conservation plan or Florida Div. of Forestry cover map;
- A list of adapted tree/shrub species for the purposes outlined;
- Plant spacing and planting method to be used, include any variation needed for different species and planting methods (e.g., interplanting, underplanting or open area planting);

- Cultural practices to be applied;
- Maintenance requirements.

### OPERATION AND MAINTENANCE

Control access by vehicles or equipment during or after tree/shrub establishment to protect new plants and minimize erosion, compaction and other site impacts. Refer to the Florida NRCS Conservation Practice Standard Use Exclusion, Code 472.

Inspect the trees and shrubs periodically and protect them from adverse impacts including insects, diseases, competing vegetation, fire, and damage from livestock or wildlife. Permits may be issued to affect control of wildlife causing damage to commercial crop trees. Contact appropriate regional office of the Florida Fish and Wildlife Commission for more information (<http://myfwc.com/aboutus/regnoffc.html#map>)

If needed, control competing vegetation until the woody plants are established. Noxious/prohibited weeds need to be controlled regardless of stand age. If pesticides are used, refer to Florida NRCS Conservation Practice Standard Pest Management, Code 595.

If survival is inadequate (see paragraph below), replanting is required. If conditions permit, replanting needs to take place during the planting season immediately following the original attempt at establishment.

Use the following minimum survival rates to determine the need to replant transplanted trees and shrubs:

- For all purposes listed (except wildlife)
  1. Survival is equal to or greater than 65% or 400 trees per acre at the end of the first growing season, *whichever results in the lesser density*.
  2. Or, greater than applicable USDA program specifications or the applicable NRCS Conservation Practice Standard.

For example, tree planting under CRP practices CP3 require survival criteria by 275 seedlings/acre in order to meet program

requirements and Florida NRCS Conservation Practice Standard Wetland Restoration, Code 657, calls for an 80% minimum survival of woody species.

- For Wildlife Habitat:
  1. Survival of southern pine is equal to 55% or 200 trees per acre at the end of the first growing season, *whichever results in lesser density*.
  2. Survival of other trees or shrubs is equal to or greater than 65%.

Survival criteria for direct seeding and natural regeneration:

- For Pines
  1. A stand of slash or loblolly pine is considered established when there are about 1,500 evenly spaced, free-to-grow (i.e., free to overhead competition) seedlings per acre.
  2. A stand of long leaf pine is considered adequate when 1,000 to 1,500 seedlings have initiated growth.
- For Oaks – an adequate stand exists when there are 500 to 600 free-to-grow seedlings per acre.

If practical, provide supplemental water as needed.

Periodic applications of nutrients may be needed to maintain plant vigor.

After trees and/or shrubs are established, refer to the standards Forest Stand Improvement, 666, and Tree/Shrub Pruning, 660, for subsequent management.

### REFERENCES

- Duryea, M.L. 2000 Forest Regeneration Methods: Natural Regeneration, Direct Seeding and Planting. Univ. Florida, IFAS, Coop. Ext. Serv. Circ. 759.
- NRCS, National Forestry Handbook. Feb. 2004.  
<http://soils.usda.gov/technical/nfhandbook/>
- NRCS, National Forestry Manual, Sep. 1998.  
<http://soils.usda.gov/technical/nfmanual/>